

(d) of this section, wearing the apparatus according to applicant's directions. At the specified temperature, the apparatus shall meet all the requirements described in paragraph (e) of this section.

(b) The apparatus will be precooled at the specified minimum temperature for 4 hours.

(c) The apparatus will be worn in the low temperature chamber for 30 minutes, or for the service time of the apparatus, whichever is less.

(d) During the test period, alternate 1-minute periods of exercise and rest will be required with the exercise periods consisting of stepping onto and off a box 21.5 cm. (8½ inches) high at a rate of 30 cycles per minute.

(e)(1) The apparatus shall function satisfactorily at the specified minimum temperature on duplicate tests.

(2) The wearer shall have sufficient unobscured vision to perform the work.

(3) The wearer shall not experience undue discomfort because of airflow restriction or other physical or chemical changes in the operation of the apparatus.

(f) Auxiliary low-temperature parts which are commercially available to the user may be used on the apparatus to meet the requirements described in paragraph (e) of this section.

**§ 84.99 Man tests; testing conditions; general requirements.**

(a) The man tests described in Tables 1, 2, 3, and 4 of this subpart represent the workload performed in the mining, mineral, or allied industries by a person wearing the apparatus tested.

(b) The apparatus tested will be worn by Institute personnel trained in the use of self-contained breathing apparatus, and the wearer will, before participating in these tests, pass a physical examination conducted by a qualified physician.

(c) All man tests will be conducted by the Institute.

(d) The apparatus will be examined before each man test to ensure that it is in proper working order.

(e) Breathing resistance will be measured within the facepiece or mouthpiece and the wearer's pulse and respiration rate will be recorded during

each 2 minute sample period prescribed in tests 1, 2, 3, and 4.

(f) Man tests 1, 2, 3, 4, 5, and 6 will be conducted in duplicate.

(g) If man tests are not completed through no fault of the apparatus, the test will be repeated.

**§ 84.100 Man tests 1, 2, 3, and 4; requirements.**

Man tests 1, 2, 3, and 4, set forth in Tables 1, 2, 3, and 4 of this subpart, respectively, prescribe the duration and sequence of specific activities. These tests will be conducted to—

(a) Familiarize the wearer with the apparatus during use;

(b) Provide for a gradual increase in activity;

(c) Evaluate the apparatus under different types of work and physical orientation; and

(d) Provide information on the operating and breathing characteristics of the apparatus during actual use.

**§ 84.101 Man test 5; requirements.**

(a) Test 5 will be conducted to determine the maximum length of time the apparatus will supply the respiratory needs of the wearer while he is sitting at rest.

(b) The wearer will manipulate the devices controlling the supply of breathing gas to the advantage of the apparatus.

(c) Samples of inspiration from within the apparatus facepiece or mouthpiece shall be taken once every 15 minutes, and shall meet the minimum requirement for oxygen specified in § 84.79(a), and the maximum allowable average concentration of carbon dioxide specified in § 84.97(c).

(d) One sample of inspiration will be taken in the case of 3-, 5-, and 10-minute apparatus.

**§ 84.102 Man test 6; requirements.**

(a) Man test 6 will be conducted with respect to liquefied breathing gas apparatus only.

(b) This test will be conducted to evaluate operation of the apparatus in other than vertical positions.

(c) The wearer will lie face downward for one-fourth the service life of the apparatus with a full charge of liquefied

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breathing gas, and then a one-quarter full charge of liquefied breathing gas.

(d) The test will be repeated with the wearer lying on each side and on his back.

(e) The oxygen content of the gas supplied to the wearer by the apparatus will be continuously measured.

**§ 84.103 Man tests; performance requirements.**

(a) The apparatus shall satisfy the respiratory requirements of the wearer for the classified service time.

(b) Fogging of the eyepiece shall not obscure the wearer's vision, and the wearer shall not experience undue discomfort because of fit or other characteristics of the apparatus.

(c) When the ambient temperature during testing is  $24 \pm 6$  °C. ( $75 \pm 10$  °F.), the maximum temperature of inspired air recorded during man tests shall not exceed the following, after correction for deviation from 24 °C. (75 °F.):

Where service life of apparatus is—	Where percent relative humidity of inspired air is—	Maximum permissible temperature of inspired air shall not exceed—	
		°F.	°C.
¼ hour or less .....	0–100	135	57
¼ hour to ¾ hour .....	0–50	125	52
	50–100	<sup>1</sup> 110	<sup>1</sup> 43
1 to 2 hours .....	0–50	115	46
	50–100	<sup>1</sup> 105	<sup>1</sup> 41
3 hours .....	0–50	110	43
	50–100	<sup>1</sup> 100	<sup>1</sup> 38
4 hours .....	0–50	105	41
	50–100	<sup>1</sup> 95	<sup>1</sup> 35

<sup>1</sup> Where percent relative humidity is 50–100 and apparatus is designed for escape only, these maximum permissible temperatures will be increased by 5 °C (10 °F).

**§ 84.104 Gas tightness test; minimum requirements.**

(a) Each apparatus will be tested for tightness by persons wearing it in an atmosphere of 1,000 p.p.m. isoamyl acetate.

(b) Six persons will each wear the apparatus in the test concentrations specified in paragraph (a) of this section for 2 minutes and none shall detect the odor or taste of the test vapor.

TABLES TO SUBPART H OF PART 84

TABLE 1—DURATION AND SEQUENCE OF SPECIFIC ACTIVITIES FOR TEST 1, IN MINUTES  
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Activity	Service time—							
	3 min-utes	5 min-utes	10 min-utes	15 min-utes	30 min-utes	45 min-utes	1 hour	2, 3, and 4 hours
Sampling and readings .....	.....	.....	.....	2	2	2	2	Perform 1 hour test 2, 3, or 4 times respectively.
Walks at 4.8 km. (3 miles) per hour.	3	5	3	4	8	12	18	
Sampling and readings .....	.....	.....	2	2	2	2	2	
Walks at 4.8 km. (3 miles) per hour.	.....	.....	3	5	8	12	18	
Sampling and readings .....	.....	.....	2	2	2	2	2	
Walks at 4.8 km. (3 miles) per hour.	.....	.....	.....	.....	6	13	16	
Sampling and readings .....	.....	.....	.....	.....	2	2	2	